CLAIMS

1. Growth method of nitride semiconductor epitaxial layer comprising:

a first step of growing a second nitride semiconductor epitaxial layer on a first nitride semiconductor epitaxial layer at a first temperature;

a second step of growing a third nitride semiconductor epitaxial layer on the second nitride semiconductor epitaxial layer at a second temperature; and

a third step of releasing nitrogen from the second nitride semiconductor epitaxial layer by increasing a temperature to a third temperature higher than the second temperature.

2. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the first and third nitride semiconductor epitaxial layers are made of a material whose equilibrium vapor pressure of nitrogen is lower than that of the second nitride semiconductor epitaxial layer.

3. The growth method of nitride semiconductor epitaxial layer of claim 1, the second nitride semiconductor epitaxial layer is converted into a metal layer in the third step.

4. The growth method of nitride semiconductor epitaxial layer of claim 1, further comprising:

a fourth step of growing a fourth nitride semiconductor epitaxial layer on the third nitride semiconductor epitaxial layer after releasing nitrogen from the second nitride semiconductor epitaxial layer.

5. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the second nitride semiconductor epitaxial layer is made of $In_xGa_{1-x}N$ ($0.5<x\leq1$).

6. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the first and third nitride semiconductor epitaxial layers are made of $Al_xGa_{1-x}N$ ($0\leq x\leq1$).

7. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the first temperature in the first step is in a range of 300℃ to 800℃.

8. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the second temperature in the second step is in a range of 300℃ to 800℃.

9. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the third nitride semiconductor epitaxial layer has a thickness in a range of 1nm to 100nm.

10. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the third temperature in the third step is 900℃ or more.

11. The growth method of nitride semiconductor epitaxial layer of claim 1, wherein the first nitride semiconductor epitaxial layer is grown on a substrate.

12. The growth method of nitride semiconductor epitaxial layer of claim 11, wherein the first nitride semiconductor epitaxial layer comprises a buffer layer grown at a relatively low temperature and an un-doped GaN layer grown on the buffer layer.

13. The growth method of nitride semiconductor epitaxial layer of claim 1, further comprising:

a step of patterning the third nitride semiconductor epitaxial layer, prior to the third step.

14. The growth method of nitride semiconductor epitaxial layer of claim 3, further comprising:

a step of separating a part including the first nitride semiconductor epitaxial layer from the other part including the third nitride semiconductor epitaxial layer.

15. Growth method of nitride semiconductor epitaxial layer comprising:

growing a buffer layer on a substrate and an un-doped GaN layer on the buffer layer;

growing InN layer on the un-doped GaN layer;

growing a GaN layer on the InN layer;

converting the InN layer into a metal layer; and

growing $Al_xIn_yGa_{1-y}N$ ($0 \leq x \leq 1$, $0 \leq y \leq 1$) on the GaN layer.

16. Growth method of nitride semiconductor epitaxial layer comprising:

a first step of growing a first nitride semiconductor epitaxial layer containing indium at a first temperature;

a second step of growing a second nitride semiconductor epitaxial layer whose equilibrium vapor pressure of nitrogen is higher than that of the first nitride semiconductor epitaxial layer, on the first nitride semiconductor epitaxial layer at a second temperature; and

a third step of releasing nitrogen from the first nitride semiconductor epitaxial layer by increasing a temperature to a third temperature higher than the second temperature to convert the first nitride semiconductor epitaxial layer into a metal layer.

17. The growth method of nitride semiconductor epitaxial layer of claim 16, wherein the first nitride semiconductor epitaxial layer is grown on a substrate.

18. The growth method of nitride semiconductor epitaxial layer of claim 16, wherein the first nitride semiconductor epitaxial layer is grown on a compound semiconductor epitaxial layer grown on a substrate.

19. The growth method of nitride semiconductor epitaxial layer of claim 17, the first nitride semiconductor epitaxial layer is made of $In_xGa_{1-x}N$ ($0.5<x\leq1$) and the second nitride semiconductor epitaxial layer is made of GaN.